

## TWO NEW SPECIES OF CAREX (CYPERACEAE) FROM MEXICO

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Recent field work has disclosed two additional species in *Carex* section *Hymenochlaenae* sensu lato, one of the largest sections in the Mexican *Carex* flora, comprising 18 species including the two described below. One of these is a member of the complex centered on *C. mackenziana* Weath., which is distinguished from other members of the section in Mexico by pubescent perigynia. This group is discussed in some detail by Reznicek (1990). Three species were known in the complex, all local endemics, and a fourth is added below. The other new species is related to *C. flexirostris* Reznicek, from Oaxaca.

***Carex queretarensis*** Reznicek & S. González, sp. nov.—TYPE: MEXICO. Querétaro: Mpio. Landa de Matamoros, ca. 7.5 (air) km SW of El Lobo (Km 226) on road (Hwy 120) to Jalpan, between El Lobo and Landa, 21°15'50"N, 99°10'13"W, 1590–1600 m, 14 Jul 1996, *González & Reznicek 10284*, *M. Pinedo* (holotype: IEB!; isotypes: ANSM! CIIDIR! ENCB! GH! MEXU! MICH! MO! QMEX! TEX! UAMIZ! US!). Fig. 1.

Plantae cespitosae; culmi 30–80 cm alti; vaginae basales purpurascentes, scabrae. Folia 5–9, plerumque basalia; laminae 6–45 cm longae, 2.5–6.2 mm latae; vaginae 1.5–12 cm longae, hispidulae; ligulae 1.1–5 (–6.4) mm longae. Inflorescentiae 9–41 cm longae; spicae (3–) 4–7; spica terminalis plus minusve erecta; spicae laterales androgynae interdum pistillatae, pendulae; bracteae infimae laminis 2.3–24 cm longis, 0.8–3.6 mm latis et vaginis 1.1–7 cm longis. Squamae pistillatae staminataeque pubescentes. Perigynia (3.6–) 4.1–5.6 mm longa, 1.4–1.6 mm lata, trigona, viridia, pubescentia, ascendente, in rostrum contracta; rostra 0.3–0.6 mm longa. Achenium 2.4–2.8 mm longum, 1.2–1.4 mm latum. Styli marcescentes; stigmata 3. Antherae 3, 2.3–3 mm longae.

Plants loosely caespitose, with short, thick rhizomes; roots brown to dark brown, not densely felted with root hairs; fertile culms 30–80 cm tall, trigonous, smooth, with scabrous, purple, bladeless sheaths with stramineous veins. Leaves 5–9, mostly basal; blades 6–45 cm long, 2.5–6.2 mm wide, plicate, more or less hispidulous on both surfaces just above ligule, otherwise glabrous, the margins antrorsely scabrous, the widest leaves 4.2–6.2 mm wide; leaf sheaths 1.5–12 cm long, more or less tightly enveloping culms, hispidulous with red prickly-hairs, especially on lower sheaths, strongly purple-tinged near base; inner band of sheaths finely hispidulous

or glabrous, stramineous to purple-mottled, the apex concave; ligules 1.1–5 (–6.4) mm long, obtuse to acute, the free portion entire, erose, or slightly ciliate. Vegetative shoots ca. 15–40 cm tall; leaves 5–9, similar to those of fertile culms; pseudoculms 2–10 cm tall. Inflorescences 9–41 cm long, with the upper 2–4 spikes somewhat overlapping and the lowest 2 spikes 2–30 cm distant; spikes single at nodes, with all but the upper pendulous on filiform, flexuous, smooth to slightly scabrous-angled peduncles; lowermost spikes with peduncles 2.5–17.5 cm long, the uppermost lateral spikes with peduncles 0.4–1.7 cm long; lowermost bracts with blades 2.3–24 cm long and 0.8–3.6 mm wide and sheaths 1.1–7 cm long, the uppermost bracts much reduced. Spikes (3–) 4–7, the terminal staminate proximally and distally, and pistillate in the middle, occasionally staminate, the lateral androgynous or the lower sometimes pistillate. Terminal spikes 1.4–5.2 cm long, 1.5–2.9 mm wide, ca. 20–40-flowered if staminate, otherwise the staminate portion (0–) 0.5–1.5 cm long and 3–8-flowered proximally, and 0.4–1.8 cm long and 15–35-flowered distally; pistillate middle portion 0.3–2.5 cm long, 5.5–7 mm wide, 1–40-flowered; peduncles (2–) 4–9 (–17) mm long. Lateral spikes 1–5.3 cm long; staminate portion (0–) 0.2–1.5 cm long, (0–) 3–25-flowered; pistillate portion 1–4.4 cm long, 8–35-flowered. Pistillate scales 2.8–5.2 mm long, 1.5–2.1 mm wide, ovate to oblong, acute to acuminate-awned with scabrous awn up to 1.8 mm long, finely and sparsely pubescent distally, as well as scabrous on the midvein, green with broad, hyaline, whitish to pale brown margins, 3-veined. Staminate scales 3.9–5.8 mm long, 1.4–1.9 mm wide, ovate to narrowly ovate, obtuse to acuminate, occasionally with a scabrous awn up to 0.4 mm long, glabrous or finely scabrous, especially on and near the midvein, green with broad, hyaline, whitish to pale brown margins, 3-veined. Perigynia (3.6–) 4.1–5.6 mm long, 1.4–1.6 mm wide, ascending, trigonous with more or less flat, elliptic to obovate sides, green, pubescent over most of the body, cuneately tapered to a short-stipitate base, ca. 15–19-veined with 3–5 veins prominent and the rest faint, tapered into a beak; beaks 0.3–0.6 mm long, green, hispidulous, the apex oblique or irregularly bidentate, hyaline. Achenes 2.4–2.8 mm long, 1.2–1.4 mm wide, trigonous with more or less flat, obovate sides, tightly enveloped by the perigynium, pale brown, short-stipitate. Styles withering; stigmas 3. Anthers 3, 2.3–3 mm long.

ADDITIONAL SPECIMENS EXAMINED. **Mexico.** QUERÉTARO: Mpio. Landa de Matamoros, 1.5 km al W del Parador de Santa Martha, 1700 m, 20 Aug 1991, *Carranza G. 3421* (CIIDIR, IEB); Mpio. Landa de Matamoros, ca. 6 km SW of El Lobo on road (Hwy 120) to Jalpan, 21°16'35"N, 99°09'21"W, 1750–1760 m, 14 Jul 1996, *González & Reznicek 10283, M. Pinedo* (CAS, CHAP, CHAPA, CIIDIR, ENCB, F, GENT, GH, IBUG, IEB, K, MEXU, MICH, MO, NY, TEX, US, WIS).

*Carex queretarensis* is locally frequent in pine-oak and oak-pine-juniper forest in the Municipio of Landa de Matamoros at ca. 1590–1760 m. Plants collected July 14 ranged from flowering to mature fruit, so fruiting presumably occurs from mid-July through August. The epithet *queretarensis* refers to the species being apparently endemic to the state of Querétaro.

All species of this complex resemble each other rather closely, but examination shows consistent, correlated differences in a number of features (Table 1). The variation appears to be neither clinal nor simply quantitative. All the taxa appear to be geographically isolated, local, endemic species.

*Carex queretarensis* is most similar to *C. pubigluma* Reznicek, sharing with that species the pubescent pistillate and staminate scales and long anthers. It



FIG. 1. *Carex queretarensis*. Habit of a flowering plant in the field. Photograph taken in population represented by *González & Reznicek 10283*. Plant is ca. 35 cm tall.

differs from *C. pubigluma*, however, in having hispidulous lower sheaths and more pointed pistillate scales; in these two characters it resembles *C. caeligena* Reznicek, which has smaller perigynia, shorter anthers, more strongly aggregated upper spikes, and longer ligules. Differences among the four known species of the complex are summarized in Table 1. A revised key to this group is presented below.

TABLE 1. Comparison of characters in the *Carex mackenziana* complex.

Character	<i>C. mackenziana</i>	<i>C. caeligena</i>	<i>C. queretarensis</i>	<i>C. pubigluma</i>
Basal sheaths	smooth	hispidulous	hispidulous	smooth
Ligule length (mm)	0.8–3.5	(5–) 5.5–14	1.1–5 (–6.4)	1.9–8.6
Uppermost 3–5 spikes	separated	strongly aggregated	± separated to somewhat aggregated	separated
Terminal spike, peduncle length (mm)	4–17	1.8–4.8 (–7)	(2–) 4–9 (–17)	4.5–13
Pistillate scale pubescence	no	no	yes	yes
Pistillate scale apex	obtuse to acuminate	acute to acuminate-awned	acute to acuminate-awned	obtuse to acute
Perigynium beak apex	obscurely bidentate	oblique or irregularly bidentate	oblique to irregularly bidentate	oblique, strongly flared
Perigynium length (mm)	2.4–4.2	2.9–4.3	(3.6–) 4.1–5.6	3.6–4.6
Anther length (mm)	2.3–3.6	1.3–2.5	2.3–3	2.3–3.8
Achene transverse section	flattened-trigonous with concave sides	trigonous with ± flat sides	trigonous with ± flat sides	trigonous with ± flat sides

1. Lower leaf sheaths hispidulous with red prickly-hairs; pistillate scales acute to acuminate-awned.
2. Pistillate scale bodies glabrous or scabrous on the midvein; ligules (5–) 5.5–14 mm long; anthers 1.3–2.5 mm long. *C. caeligena.*
2. Pistillate scale bodies pubescent; ligules 1.1–5 (–6.4) mm long; anthers 2.3–3 mm long. *C. queretarensis.*
1. Lower leaf sheaths glabrous; at least some pistillate scales obtuse.
3. Pistillate and staminate scales pubescent, the margins ciliate; perigynium beaks with a hyaline, flared, ciliate apex. *C. pubigluma.*
3. Pistillate and staminate scales glabrous or scabrous on the midvein, the margins not ciliate; perigynium beaks more or less bidentulate at apex. *C. mackenziana.*

***Carex pinophila*** Reznicek & S. González, sp. nov.—TYPE: MEXICO. Querétaro: Mpio. Landa de Matamoros, ca. 2 km SW of Pinal de Amoles on road (Hwy 120) to San Juan del Río, 21°07'47"N, 99°38'02"W, 2700 m, 15 Jul 1996, González & Reznicek 10293, M. Pinedo (holotype: IEB!; isotypes: CIIDIR! MEXU! MICH!). Fig. 2.

Plantae cespitosae; culmi 70–90 cm alti; vaginae basales rubescentes, glabrae. Folia ca. 11–15 plerumque basalia; laminae (6–) 15–60 cm longae, (1.3–) 2.1–3.6 mm latae; vaginae 3.2–10 cm longae, stramineae, rubrotinctae, glabrae; ligulae

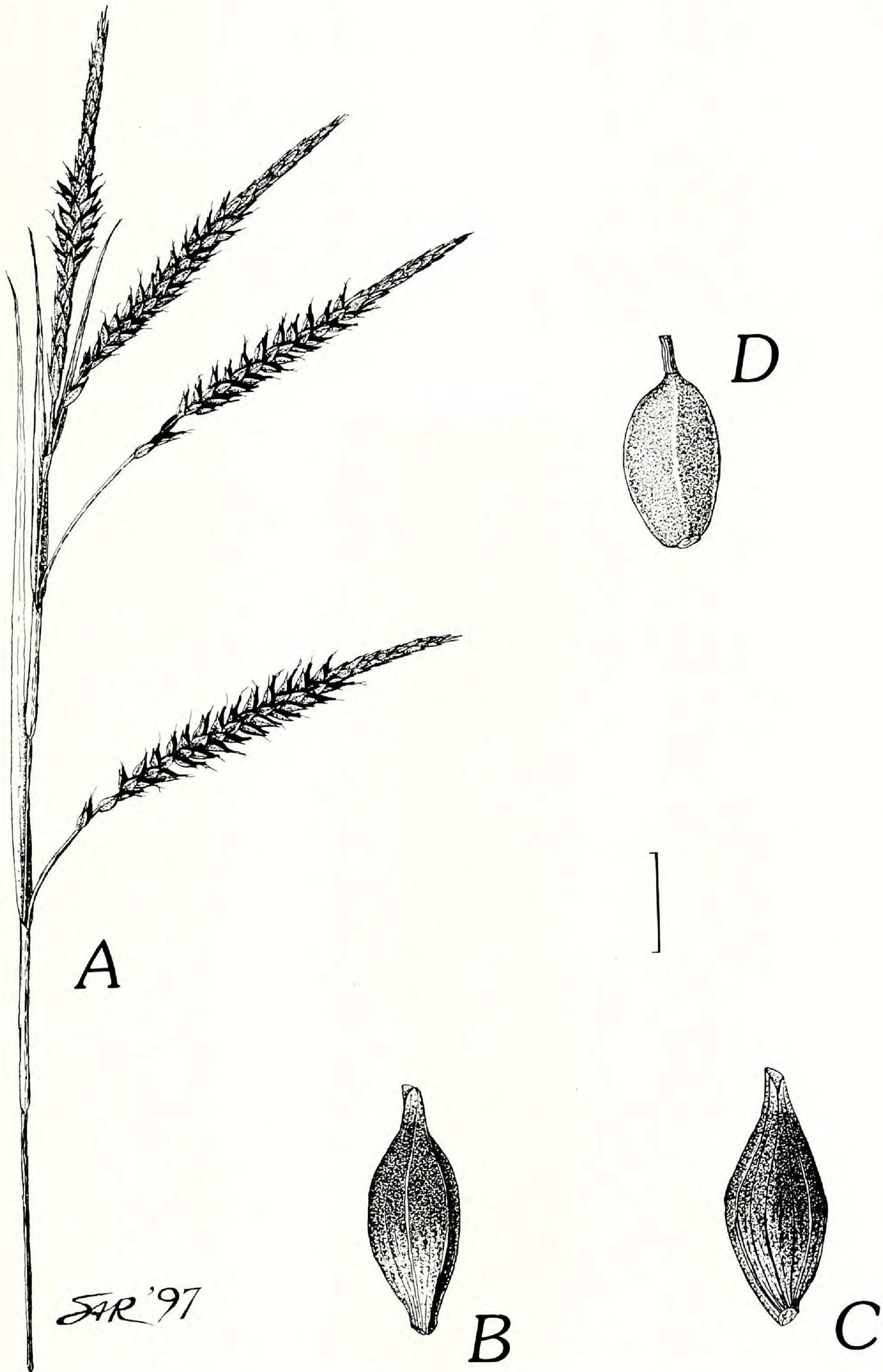


FIG. 2. *Carex pinophila*. A. Inflorescence. B. Perigynium, side view. C. Perigynium, front view. D. Achene, front view. A, scale bar = 1 cm; B–D, scale bar = 1 mm. Drawn by Susan Reznicek from the type.

2.5–5.5 mm longae. Inflorescentiae 7–11 cm longae; spicae 3–5; spica terminalis plus minusve erecta; spicae laterales androgynae, infimae pendulae; bractae infimae laminis 3.1–6 cm longis, 0.7–1.3 mm latis et vaginis 1.2–1.6 cm longis. Perigynia 2.3–3 mm longa, 0.9–1.2 mm lata, ascendentia, trigona, viridia, purpureomaculata, glabra, in rostrum contracta; rostra 0.4–0.7 mm longa. Achenium ca. 1.5–1.7 mm longum, 0.8–1.1 mm latum. Styli marcescentes; stigmata 3. Antherae 3, ca. 1.4–1.8 mm longae.

Plants caespitose in small clumps or solitary, with short, knotty rhizomes; roots brown, not densely felted with root hairs; fertile culms ca. 70–90 cm tall, trigonous, smooth, with glabrous, reddish, bladeless sheaths with stramineous veins. Leaves ca. 11–15, mostly basal; blades (6–) 15–60 cm long, (1.3–) 2.1–3.6 mm wide, flat to plicate, glabrous, the margins and midrib smooth or finely antrorsely scabrous distally, the widest leaves ca. 3.2–3.6 mm wide; leaf sheaths 3.2–10 cm long, tightly enveloping the culms, glabrous, red-tinged; inner band of sheaths hispidulous near apex, stramineous and faintly red-striped, faintly veined, the apex concave, thickened and finely (and sometimes inconspicuously) ciliate; ligules ca. 2.5–5.5 mm long, acute, usually reduced on upper leaves, the free portion thickened and scabrous, reddish to stramineous. Vegetative shoots ca. 40–60 cm tall; leaves 5–7, similar to those of fertile culms; pseudoculms ca. 6–10 cm tall. Inflorescences ca. 7–11 cm long, with the upper spikes strongly overlapping and the lowest 2 spikes 2.5–4.7 cm distant; spikes single at nodes, the lower pendulous, the upper ascending to erect, on filiform, flexuous, smooth or sparsely scabrous peduncles; lowermost spikes with peduncles (1.3–) 1.9–2.6 cm long, the uppermost lateral spikes with peduncles ca. 0.7 cm long; lowermost bracts with blades 3.1–6 cm long and 0.7–1.3 mm wide, dorsally hispidulous along the veins, the sheaths 1.2–1.6 cm long, the uppermost bracts much reduced. Spikes 3–5, the terminal staminate proximally and distally, and pistillate in the middle, the lateral androgynous. Terminal spikes 3.2–4 cm long, staminate portion 9.2–13 mm long, 1.2–2.3 mm wide, and 10–14-flowered proximally, ca. 13–18 mm long and 55–60-flowered distally; pistillate middle portion ca. 6.5–10.5 mm long, 3.6–3.8 mm wide, 13–18-flowered; peduncles ca. (5.6–) 8.8–13.2 mm long. Lateral spikes (2.4–) 3.3–4.7 cm long; staminate portion 6.7–16 mm long, ca. 16–45-flowered; pistillate portion (10.5–) 19.5–30 mm long, 3.3–4.4 mm wide, ca. (8–) 30–40-flowered. Pistillate scales 2.6–3.3 mm long, 1.3–1.8 mm wide, ovate, obtuse to acute, glabrous, reddish purple with narrow hyaline margins, faintly 5–7-veined. Staminate scales 2.9–4 mm long, 1.1–1.8 mm wide, narrowly elliptic to obovate, obtuse to acuminate, glabrous, reddish purple with narrow hyaline margins, 1–3 (–9)-veined. Perigynia 2.3–3 mm long, 0.9–1.2 mm wide, ascending, more or less flattened-trigonous with more or less flat, obovate sides, green with reddish purple mottling especially distally (sometimes uniformly purple distally), scabrous on the main veins just below the beak, more or less cuneately tapered to the base, ca. 11–16-veined with 2 veins prominent and the rest fainter, contracted into a beak; beaks 0.4–0.7 mm long, green with dense reddish purple mottling, scabrous on the main veins, the apex oblique, erose. Achenes ca. 1.5–1.7 mm long, 0.8–1.1 mm wide, trigonous with more or less flat, obovate sides, tightly enveloped by the perigynium, brown, tapered to the base. Styles withering; stigmas 3. Anthers 3, ca. 1.4–1.8 mm long.

*Carex pinophila* is known only from the type, collected in Querétaro in deep pine duff in a moist forest of *Pinus patula* Schldl. & Cham. on a steep slope at 2700 m. Plants were rare and localized at the site, and few individuals were fruiting, perhaps due to the heavily shaded habitat. On July 15, plants were somewhat

overmature, so fruiting probably occurs through June and into early July. The epithet *pinophila* refers to the habitat of the type.

This apparently very rare species is related to *Carex perlonga* Fernald, *C. flexirostris* Reznicek, and *C. chiapensis* F. J. Herm. These four Mexican species of section *Hymenochlaenae* are relatively narrow-leaved plants of moist forests, with red bases, terminal spikes staminate proximally and distally and pistillate in the middle (rarely staminate), glabrous perigynia contracted into a distinct beak (except in *C. chiapensis*), and mostly awnless pistillate and uniformly awnless staminate scales. From all these species, *C. pinophila* can be separated easily by its smooth lower sheaths, and short perigynia 2.3–3 mm long. *Carex chiapensis*, *C. flexirostris*, and *C. perlonga* have the lower sheaths sparsely to densely hispidulous with red prickle-hairs (except sometimes in *C. chiapensis* with perigynia 3.9–6 mm long). All three species also tend to have larger perigynia 2.7–6 mm long, and have longer inflorescences (7.5–) 10–41 cm long, and longer lower inflorescence bracts (3.6–) 6–32 cm long with sheaths (1–) 1.6–5.9 cm long. *Carex pinophila* has shorter inflorescences 7–11 cm long with short, small bracts with blades 3.1–6 cm long and with sheaths only 1.2–1.6 cm long. *Carex chiapensis* and *C. perlonga* have broad lower inflorescence bracts 1.7–5 mm wide, but *C. pinophila* has narrow inflorescence bracts 0.7–1.3 mm wide. In the last feature *C. pinophila* most closely resembles *C. flexirostris*, which has the lower bracts with blades only 1–1.9 cm wide. If a small individual of *C. flexirostris* with smooth sheaths were to occur (or if the sometimes sparse prickle hairs were overlooked), *C. pinophila* could be distinguished by its thickened apex to the inner band of the sheath, perigynia not at all outcurved, and shorter achenes 1.5–1.7 mm long. *Carex flexirostris* has thin, fragile apices to the inner band, at least slightly outcurved perigynia, and achenes 1.8–2.1 mm long.

Because of its smooth sheaths, *Carex pinophila* would key to *C. pertenuis* L. H. Bailey rather than *C. flexirostris* in the keys in Reznicek (1986) and Jones and Reznicek (1992). These two species can be readily distinguished: *C. pertenuis* has  $\pm$  elongate rhizomes, all the spikes androgynous, awned pistillate and staminate scales, and perigynia gradually tapered to the apex, whereas *C. pinophila* has short, knotty rhizomes, the terminal spike staminate distally and proximally and pistillate in the middle, awnless pistillate and staminate scales, and perigynia contracted into a distinct beak.

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